

## In the Specification

### Page 4, lines 12 - 15:

A2 Two products, CrossKeys Resolve Si (trade mark) network performance and monitoring software and Hewlett-Packard's Firehunter (trade mark) network service performance monitoring software have sought to capture SLA related information but are limited in several respects as described below.

### Page 4, line 16 - page 5, line 28:

A3 CrossKeys Resolve Si (trade mark) software seeks to help service providers to manage service performance. Network information is correlated with customer information and quality of service objectives. The software aims to help service providers to ensure that they are delivering high value services that match the needs of customers. Data is retrieved from each end point and link that together make up a delivered service, allowing reports to be generated that illustrate performance issues. In this way the Resolve software helps service providers to compare the service they are providing against those specified in service level agreements. A server is provided which maintains a service level management object model and client workstations run programs termed "rResolve reporter" and "rResolve eConfiguration" (trade marks). The rReporter software generates pre-configured reports for customers or for the service provider which present information about how the service performance compares with the conditions set out in service level agreements. The reports are distributed by email, by file, on screen or in print. The rResolve eConfigurator software is a tool for system administrators to control customer, service and contract data. Using this software system administrators are able to create SLAs.

CrossKeys Resolve Si software focuses specifically on fault and performance monitoring. For example, service providers can set up early warnings of SLA violations by using multiple thresholds for Quality of Service (QoS) parameters. If a service is deteriorating, Resolve warns the service provider of impending problems before they impact. Hewlett-Packard's Firehunter (trade mark) software product also provides some capability to capture SLA related information. Firehunter is designed to monitor and report on the delivered quality of Internet services and provides alarms to warn of potential service level

agreement violations before they occur. Firehunter software also generates reports that illustrate performance issues for customers.

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Both the CrossKeys Resolve software and Hewlett-Packard Firehunter software products are limited in that they do not have the capability to reason over the information presented to them, not meaningfully relate the service requirements from SLAs to the underlying service configuration.

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Page 12, lines 4-25:

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~~Co-pending US patent application numbers 08/021208, 08/018895, 08/021225, 08/021649, 6,233,610 and 09/124479, 6,349,332~~ (all assigned to Nortel Networks Corporation or related companies) are related to the present invention and are incorporated herein by reference. These US patents ~~applications~~, describe a management system for a communications network where the management system uses a model based approach. That is, a model of a communications network is created and stored in a network management system and used to manage that communications network. Network elements that are to be managed are represented by objects in the model and a key feature involves using separate model representations for the function of a network element and the specific implementation of that network element. By doing this it is possible to easily adapt the model in the situation that a network element such as a switch is replaced by a switch of another manufacturer, but which performs the same basic functions. Whilst these co-pending applications describe communications network management systems which are fully functional and operable, they do not specifically address the problems associated with provisioning leased lines in internet protocol networks.

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## ABSTRACT

### Provisioning leased lines in an internet protocol communications network

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Leased lines are provisioned over an internet protocol communications network ~~supporting differentiated services~~ by providing bandwidth tallies at each node and link in the network. Traffic to be sent over the leased line is labelled as high priority at the entry point to the leased line. Differentiated services mechanisms are set up at each node in the route to

allow high priority traffic on the leased line to be processed before other traffic. A customer requests a leased line between two points and with a specified bandwidth and quality of service. ~~A route between the two specified points is chosen, for example, using an algorithm such as shortest path first (SPF). The route may be pinned e.g. using MPLS.~~ Bandwidth tallies are checked along the chosen path to ensure that the requested bandwidth is available. As well as this checks are made to ensure that no more than a threshold level of high priority traffic will be present at any one node or link. ~~A discrete event simulator may also be used to forecast congestion points in the network. If insufficient bandwidth or node resources are available, the network is either reconfigured or the leased line proposal rejected.~~ Once the network is configured such that sufficient bandwidth is available and high priority traffic levels will not exceed the threshold level, the leased line is available for use.

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